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Friend has accomplished in a thoroughly satisfactory way in the present volume.

The action of air and water and also steam upon iron is discussed at length, together with the various theories which have been advanced to explain corrosion. The author's experiments to prove that a trace of carbonic acid, however minute, is essential in order that rusting will take place, are of but academic interest, since such conditions can never be duplicated except with the refinements of a laboratory; and his conclusion that the electrolytic theory of iron is untenable is not warranted. In fact, the so-called acid theory which the author vigorously defends is none other than the electrolytic theory, where the assumption is made that the hydrogen ion concentration in pure water is not great enough to produce a speed of reaction sufficiently high to make the rusting of iron at low temperatures obvious; while by the introduction of carbonic acid the concentration of the hydrogen ions is increased to such a point that iron will pass into solution rapidly enough to appear as rust. The book in many places suffers somewhat by the author's unwillingness to make use of the conceptions introduced by the electrolytic theory which, were they used, would simplify the treatment.

The chapters on the factors influencing the rate of corrosion exposed to natural forces, the action of acids and single salts and other electrolytes upon iron are most complete and give the reader a clear idea of the existing knowledge of this phase of the subject. Chapter XII. is devoted to the passive state of iron, and while it seems to contain all that we know upon the subject it emphasizes the fact that our present knowledge is far from giving us a satisfactory explanation for this peculiar phenomenon. The later chapters deal comprehensively with the influence of chemical composition upon the durability of iron, electrical and galvanic action, and the relative rate of corrosion of iron and steel.

It is a matter of regret that the author has been misled, as have also the reviewer and others, by giving credence to statements and data supplied by the American Rolling Mill

Co., of Middletown, Ohio, which he publishes on pages 114, 250, 276 and 251, regarding the purity of this firm's products. For example, the material said to have the analysis published on page 114, as containing 99.954 per cent. iron, and which on page 276 is proposed as a standard for *pure iron* on which to base a corrosion factor, was later found by the author himself, much to his surprise, to contain .172 per cent. copper.

The book constitutes a distinct and valuable contribution to the literature on the subject of corrosion, and will prove of interest to the general reader as well as of great service to those particularly interested in this field.

WILLIAM H. WALKER

Principles of Electrical Engineering. By HAROLD PENDER, Professor of Theoretical and Applied Electricity in the Massachusetts Institute of Technology. New York, McGraw-Hill Book Company. 1911. Pp. xviii + 438.

Convinced that the principles of electrical engineering are the principles of physics—a fact too frequently overlooked—and recognizing that a clear conception of these principles is essential for a proper understanding of the complicated reactions that take place in electric machinery and transmission circuits, the author of this book in an admirable manner deals successively with the more important phenomena of electricity and magnetism, continuous and alternating currents. On the whole the treatment is satisfying and thorough. The mathematical discussions are adequate but, being merely a means to an end, are not too extensive. Descriptions of machinery and apparatus—even of the transformer—are entirely omitted, the book having the same relation to electrical engineering as a first-class treatise on mechanics has to mechanical engineering. There has long been a demand for a comprehensive and thorough treatise of this kind. It has been customary either to shirk the matter and use descriptive texts, or to use separate texts, on the elements of electricity and magnetism, electrostatics, alternating currents, etc.

Technical schools should make every endeavor to develop men who are capable of advancing the art and who are not mere followers of "best practise," an end that may be secured by the more general use of books of this type. The reviewer agrees thoroughly with the author's point of view and in general with his methods; minor criticisms seem unnecessary. The lack of reference to the work of others is noticed. The abbreviation of "logarithm" to *ln*, in the same font as is used for expressing quantities, seems undesirable; thus, *ln i* is not recognized at once as the familiar *log i*. Some statements in regard to units might well be qualified by the insertion of "sometimes used" or of some similar phrase; since, for example, no electrical congress has recommended the "gilbert" or the "abvolt," objection may be taken to the statements that the C.G.S. unit of magnetic potential difference is the "gilbert" (p. 92) and the C.G.S. unit of electric potential difference is the "abvolt." In general, however, the phraseology is precise.

FREDERICK BEDELL

Electro-Analysis. By EDGAR F. SMITH, Professor of Chemistry and Provost, University of Pennsylvania. Fifth edition. Philadelphia, P. Blakiston's Son & Co. 1911. 12mo. 332 pages, 46 illustrations, flexible leather binding. Price ?

The revised and enlarged edition of this attractive and useful book contains, as new material, the essentials of all that has appeared upon electro-analysis during the past four years. The author particularly emphasizes his continued success in using the mercury cup and his conviction of its wide utility in electrolytic analysis. To those unfamiliar with the previous editions it may be said that the work contains practically everything of value extant in electro-analysis, presented in most attractive and available form, and that possibly half of the whole subject matter is the direct work of Dr. Smith and his students and assistants. It is quite pertinent to call attention to the fact that many of the methods of

exact quantitative separation and precipitation used in electro-analysis are borrowed from and constitute modifications of industrially applied processes; this is especially true of the mercury cathode methods; reciprocally it is even still more evident that many valuable industrial processes have evolved from the laboratory investigations and the exact manipulations of electro-analysis, and yet more are waiting to be developed. This reciprocal excitation of laboratory and works is a particularly gratifying object lesson in modern scientific and industrial interdependence. We therefore recommend the book most heartily, not only to chemical analysts, but just as strongly to technical electrochemists studying the problems of electrochemistry, both in the research laboratory and in the works.

JOSEPH W. RICHARDS

*THE HABITS OF FLIES OF THE GENUS
CORDYLOBLA, PARASITIC ON MAN
IN AFRICA*

In Africa the larvæ of certain flies (*Cordylobia*) of the family Muscidae are parasitic under the skin of man and other warm-blooded animals in the same manner as are the larvæ of many of the flies usually grouped together as Cæstridæ. Until recently the manner in which *Cordylobia* infected its host was unknown. Independent results have now thrown light on this question.

Monsieur E. Roubaud, in the *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences* of the 23d of October, 1911, presents the results of his studies of the "Ver du Cayor," *Cordylobia anthropophaga* Blanchard. The larva is found under the skin of man and domestic animals. In the Cæstridæ, with the forms found in tumors under the skin, two distinct modes of infection of the host are known. In both cases the eggs of the fly are laid upon the host. In one case the newly hatched larvæ penetrate at once to their proper habitat, but in the other the eggs are swallowed by the host and the newly hatched larvæ bury themselves in the tissues of the œsophagus and only reach the surface after protracted wanderings within the body of